SEEDS OF CHANGE: HOW CURRENT STRUCTURE SHAPES THE TYPE AND TIMING OF REORGANIZATIONS

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ABSTRACT

Research summary. This paper develops theory on how an organization's structure affects future reorganizations. I highlight that a firm's structure shapes not only the locus of decision-making power (i.e., centralization and decentralization) but also the employees' interaction structure. I develop micro-level theory that connects the firm's structure to the interactions among its employees – for instance, its influence on the time employees spend adjusting their behavior after a reorganization. This theory predicts that some structures are more likely than others to promote a reorganization to occur sooner. I use a unique, hand-collected data set of reorganizations in the cell-phone manufacturing industry to test and find directional support for this theory.

Managerial summary. I examine the effect of a firm's current structure on its corporate reorganization decisions, which are defined as the addition and/or removal of business units. I posit that the way employees are grouped into those business units may affect both the type and timing of subsequent reorganizations; the reason is that employees of similar (resp. different) backgrounds should need less (resp. more) time to achieve effective collaboration. Using data on the reorganizations of cell-phone manufacturing firms during 1983–2008, I find directional support for the theory. This result implies that managers may need to watch closely any reorganization that shifts the firm toward more heterogeneous interaction structures – because its implementation may well require additional time.

Keywords: reorganizations, organization design, organization structure, corporate strategy, cell-phone industry

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INTRODUCTION

Between 2002 and 2012, LG Electronics reorganized its corporate structure nine times; Nokia announced eight reorganizations during the same period, and Yahoo! underwent two major reorganizations in 2012 alone. Corporate reorganizations – that is, the addition and/or removal of business units – are a common occurrence among multi-business entities (Allen, 1977; Karim, 2006, 2009). Many firms choose to initiate reorganizations frequently even though doing so incurs costs due to disruption, changed operations, and de-motivated employees (Bond, Flaxman, & Bunce, 2008; Lamont, Williams, & Hoffman, 1994).

Traditional perspectives on reorganizations have sought to identify what drives these costly changes – in particular, whether the triggers are internal or external to the firm (Boeker, 1997; Davis, Eisenhardt, & Bingham, 2009; Karim & Kaul, 2015; Karim & Williams, 2012; March & Simon, 1958; Tushman & Romanelli, 1985). Although it is commonly acknowledged that reorganizations are driven by both internal and external factors, most of this literature focuses on the latter (Burns & alker, 1961; Chandler, 1962; Donaldson, 2001).

In contrast, this paper contributes to a growing literature that explores the role played by a firm's current structure as an *internal* driver of reorganization decisions (Boumgarden, Nickerson, & Zenger, 2012; Gulati & Puranam, 2009; Nickerson & Zenger, 2002). The main premise underlying these research efforts is that a firm's structure is always inherently imperfect and entails tradeoffs. I examine such trade-offs between different structures more closely and develop theory to examine how current structure affects the type and timing of reorganizations.

I highlight that reorganizations fundamentally affect two aspects of organization design: (1) the locus of decision-making power, as determined by centralization versus decentralization; and (2) the interaction structure among employees via the grouping of business units (i.e., by function, product, or market), which determines how they are expected to collaborate. The organization design literature tends to conflate these two aspects by assuming that centralization implies a functional form and decentralization a divisional one (and vice versa). Although the correlation between these choices may be high, I argue that carefully distinguishing between the

locus of decision making (centralized or decentralized) and the interaction structures among employees (grouped around functions, products, or markets) is a fruitful avenue for deepening our understanding of the effects of organization design on reorganizations.

I build on the premise that all structures have limitations, which eventually trigger reorganizations intended to overcome them. I extend this reasoning to suggest a novel theoretical account that can explain the type *and timing* of reorganizations – whose seeds, I argue, are sown in the current structure. More specifically, I explore the effect of a firm's current structure on the interactions among its employees. Focusing on how employees collaborate in response to changes in the firm's direction allows me to explain (i) how a firm's current structure affects the *type* of structure chosen in a reorganization and (ii) how the process of adjusting to different types of new structure affects the *timing* of subsequent reorganizations.

The hypotheses developed here are tested in a longitudinal, large-sample study that relies on a unique data set of reorganizations in the global industry of manufacturing cell phones. The outcomes confirm the trend of reorganizations shifting away from their current interaction structure. These results accord with the literature's emphasis on the importance of the focal firm's structure as an internal driver of reorganizations. This connection has been widely theorized and also shown anecdotally in case studies (Boumgarden et al., 2012; Carnall, 1990; Cummings, 1995; Eccles & Nitin, 1992; Mintzberg, 1979), but I am not aware of any efforts to test it empirically in large samples. Furthermore, after controlling for external factors, I find that the firm's current structure also affects how *soon* the next reorganization occurs. This finding offers directional support – at the macro-level – for the hypothesized micro-level timing effect.

The results reported here contribute to the literatures on organization design and reorganizations. First, this study enriches our current understanding of reorganizations as oscillations between centralized and decentralized structures. By distinguishing the firm's interaction structure from its decisions vis-à-vis centralization and decentralization, I underscore that repeated reorganizations allow organization designs to shift in ways that result in different structural interactions. This paper contends that a more fine-grained conceptualization of

structure can prepare the ground for deeper insights into organization design. For instance, I broaden the view of reorganization, as shifting decision-making power upward or downward, by conceptualizing it in terms of interaction structures with different foci, as influenced by the grouping decisions, that are adopted in response to the current structure's limitations. Thus I explore interaction structures as a second factor vital to any reorganization, one that has been understudied and often confounded with research into the locus of decision-making power.

Adopting this multi-dimensional view of organization design serves also to highlight the *learning* inherent in reorganizations. After one reduces the level of abstraction and recognizes that interaction structures lie on a continuum, it becomes more apparent that each re-design is a step forward but with a modified focus. Thus repeated reorganizations can be fruitfully viewed as a winding path up a complex, multi-peaked mountain range. In this metaphor, a firm might be climbing one performance peak only to realize that another peak – up a different slope – might lead to higher performance. It is crucial that this latter slope has a higher starting point than the former: the firm does not return to the bottom of the hill and start climbing again. It is only by scaling the first peak that the firm can reach the foot of the second one and perceive its advantages.

Second, I develop theory on the connection between micro-level processes and macro-level organizational outcomes. In particular, I propose the existence of a micro mechanism that underlies reorganization design choices and then explain why the timing of reorganizations may be critically influenced by who works with whom in the various business units. Although the available data can be used to test only the macro-level effects of my proposed mechanism, that is an essential first step in establishing this macro–micro link in reorganization decisions. Finally, the organization design literature tends to focus on environmental factors and to discount the firm's current structure; environmental conditions are often viewed as being so determinative that an organization's new design is effectively drawn up *de novo* when those conditions change. Yet the theory developed here underscores why a reorganization is more properly viewed as a re-design that is both inspired and limited by the structure already in place. The implication of this

insight is that two firms may react to the same environmental shock by adopting organizational structures that are quite different – that is, because the choice of a new structure is affected by environmental demands *and* by the firms' respective current structures.

In addition to these theoretical contributions, I make two empirical ones. First, I conduct a large-sample empirical test of structure as a systematic driver of reorganizations. In this I extend current knowledge on the internal drivers of reorganizations by showing how different types of structure may asymmetrically influence the timing of the next reorganization. This timing effect also has direct managerial relevance: recognizing that adjustment rates differ as a function of the current structure can help managers improve the implementation of structural changes. Second, I demonstrate how one can measure and analyze structure itself – as well as differences among reorganizations – in terms of direction and timing. Shifting the analysis away from organization charts and toward business units enables development of a continuous measure that yields a more nuanced way to track, both conceptually and empirically, the changes in an organization's design.

THEORY AND HYPOTHESES

Structure as an Internal Driver of Reorganizations

Various studies have investigated the role of current structure in reorganization decisions.[1] In this context, structure is viewed as an important strategic tool that affects the locus of decision-making authority. By choosing a structure, management effectively signals which direction the

[1] Over the past several decades, scholars have explored the drivers of reorganization in some detail. The causes most often studied are selection pressures exerted by changes in a firm's scope and/or external environment (Burns & alker, 1961; Chandler, 1962; Davis et al., 2009; Girod & Whittington, 2017; Hannan & Freeman, 1984; Karim, Carroll, & Long, 2016) and the desire to innovate or to improve efficiency through repeated reorganizations (Karim, 2006, 2009, 2012; Karim & Kaul, 2015). The adoption of new organizational forms may also be triggered by prevailing trends (Abrahamson, 1996) or by the diffusion of new forms among players that are tied together in organizational fields (DiMaggio & Powell, 1983). A reorganization may be initiated by internal factors also, such as changes in business unit managers (Karim & Williams, 2012) or in leadership – as when a new CEO looks to initiate a shift in strategy (Boeker, 1997; Goodstein & Boeker, 1991; Simons, 1994) or to shift the organization toward his own paradigm (Helmich & Brown, 1972; Miller, 1993; Tushman & Romanelli, 1985). There are still other internal factors that can lead to reorganizations; examples include attempts to differentiate goals and re-direct attention (March & Simon, 1958), to counter "adverse learning" (Obloj & Sengul, 2012), to address politics and conflict (Cyert & March, 1963), and to improve collaboration (Galunic & Eisenhardt, 2001). I address how the firm's *current structure* affects both the type and timing of reorganizations.

firm intends to take and which strategic goals are considered most important (Cyert and March, 1963/2001; Nadler and Tushman, 1997; Thompson, 1967). This literature has focused on the centralization and decentralization of decision making. For example, Mintzberg (1979) noted that American corporations tend to shift repeatedly between these options, and Carnall (1980: 18) identified the repeated choice between centralization and decentralization as one of the firm's principal design dilemmas (see also Cummings, 1995; Eccles and Nohria, 1992).

This oscillation between centralized and decentralized structures motivates the research exploring mechanisms that might account for this pattern (Boumgarden *et al.*, 2012; Gulati and Puranam, 2009; Nickerson and Zenger, 2002). In these papers, the oscillation between centralization and decentralization is interpreted as chief executive officers (CEOs) attempting to overcome the limitations of organizational structure. If one assumes that the firm's structure can exhibit only discrete configurations (e.g., centralized or decentralized) and that the "ideal" organizational structure lies between them, then systematic oscillation in successive reorganizations should effect (at least temporarily) such a "middle way" solution – that is, given the slow adjustment of the firm's informal organization to changes in its formal structure. On this account, then, CEOs oscillate between centralization and decentralization in order to prevent too strong an alignment with a particular structural form.

Along similar lines, the effects of centralizing versus decentralizing *tactical* decision making – as regards, for instance, product or technology choices – have been explored in the telecommunications industry. For example, (Joseph, Klingebiel, & Wilson, 2016) discussed how, because of different problem-solving processes, the locus of decision making affects the content of a firm's key strategic decisions.

This field has generated a number of insights into how the firm's current locus of task-related decision-making authority both affects and is affected by reorganizations. Yet a firm's structure influences not only those decision rights but also, and perhaps more fundamentally, the particular goals and challenges on which employees focus. It is thus the aggregate behavior of employees, as influenced by the firm's structure, that ultimately determines an organization's

outcomes and performance. A firm's structure groups and links employees in certain ways, emphasizing some interactions more strongly than others. So in effect, structure determines which goals and challenges end up being prioritized. Hence I focus on this relatively underexplored dynamic of how a firm's reorganizations are affected by its employees' current *interaction structure*.

Interaction Structure, Organization Design, and Centralization

Establishing a design has two broad effects on the organization. First, it identifies the locus of decision-making power, which is reinforced by hierarchy and incentives, and establishes who has authority over which domains. Second, an organization design delineates interaction structures, which are reinforced by business units and shared goals, and establish who is to coordinate with whom.

There are myriad possible interaction structures among the employees of a business unit. Consider, for example, one such unit with the four employees shown in Figure 1: two engineers (blue) and two salespeople (red). With four employees there are a total of six possible two-way interactions (black arrows) and $2^6 = 64$ possible interaction structures (many of which allocate the same employee to more than one unit). So for a unit with N employees, there can be as many as $M = N(N-1)/2$ two-way interactions and $2^M = 2^{N(N-1)/2}$ possible interaction structures.

[[INSERT **FIGURE 1** ABOUT HERE]]

Despite this large set of structures, organization design tends to focus on functional and divisional structures (Chandler, 1962) or their combination as matrix structures (vis & Lawrence, 1977). Whereas *functional* structures group individuals in terms of their functional expertise, the basis for *divisional* structures is grouping in terms of products or markets.

Much of the literature presumes that functional and divisional structures are equivalent to (respectively) centralized and decentralized structures. Although this assumption may hold for the pure forms of such structures (e.g., the descriptions of DuPont and GM in (Chandler, 1962), the posited equivalence becomes problematic when one considers the many hybrid structures adopted by today's organizations. For example, a matrix structure with global research and

development (R&D) and sales units and with multiple product-based units is difficult to categorize as being either centralized or decentralized. I argue that, although centralization and decentralization clearly capture the locus of decision-making power, functional and divisional structures are more reflective of particular chosen interaction structures. Clearly distinguishing between these two perspectives makes it easier to examine the different aspects of organization design and their effects, both theoretical and empirical, on reorganizations.

Interaction Structure: Homogeneous and Heterogeneous Units

There are distinct benefits associated with the two design options for the employee interaction structure at the business-unit level. A firm can either group individuals with the same functional expertise into *homogeneous* units (e.g., R&D or manufacturing units)[2] or group individuals with distinctive areas of expertise into *heterogeneous* units (e.g., product- or market-based units).[3]

Business units that emphasize homogeneous interaction structures ("homogenous units") align incentives and goals among individuals of *similar* backgrounds. This approach eases communication and collaboration between employees by grouping together individuals with similar functional expertise; see panel (a) of Figure 2. A critical feature of homogeneous units is that they benefit from the strong similarity in how their employees view the world and perceive and prioritize problems (Ancona & Caldwell, 1992; Cronin & Weingart, 2007; Dougherty, 1992; Joyce, 1986). These shared representations facilitate employee coordination, which tends to improve group performance (HUBER & LEWIS, 2010); for a review of the benefits and downsides of group diversity, see (kanth, Harvey, & Peterson, 2016) . When these benefits are aggregated to the level of corporate structure, homogeneous units enable economies of scale – for example, a global sales office that handles ten markets requires fewer employees and entails

[2] In this paper, I assume a direct mapping of homogeneous units onto functional units and of heterogeneous units onto product- or market-based units. However, the mapping may differ in other empirical contexts.

[3] The distinction between homogeneous and heterogeneous units is a relative one. I do not mean to imply that homogeneous units contain employees with the exact same background; rather, the employees grouped by their functional expertise (say, engineers and scientists in an R&D lab) are *relatively more similar to each other* than are employees from various functional backgrounds who are grouped by a particular market or product line.

less operational overhead than would ten individual sales offices – thereby reducing costs and improving efficiency.

[[INSERT **FIGURE 2** ABOUT HERE]]

Yet because of their ability to generate such strong internal collaboration, homogeneous units tend to become increasingly isolated over time and to form functional "silos" with little or no communication across units (Chandler, 1962; Porter, 1985; Williamson, 1991). Hence the chief limitations of a corporate structure comprising many homogeneous units are poor – or nonexistent – cross-functional collaboration and severely compromised market responsiveness.

The benefits of business units that emphasize heterogeneous interactions ("heterogeneous units") mirror the limitations of a homogeneous grouping (and vice versa). At the business-unit level, heterogeneous units facilitate cross-functional communication by grouping individuals with distinctive areas of expertise; see panel (b) of Figure 2. Although effective coordination is then more difficult to achieve (HUBER & LEWIS, 2010), a well-established heterogeneous unit can improve product design and flexibility (Postrel, 2002) by emphasizing cross-functional collaboration through collocation and joint incentives – while simultaneously benefiting from the unit's diversity of knowledge and perspectives (Bantel & Jackson, 1989). Aggregating the benefits of heterogeneous units to the corporate level, the result is greater market responsiveness – as when, in an integrated product-based unit, information on market demand can be relayed more promptly and effectively to its internal R&D unit – in addition to greater flexibility and adaptability. However, it is expensive to maintain a corporate structure consisting of many heterogeneous units: each such unit may require its own R&D, sales, and marketing subunits, which increases costs because of duplicated effort.

So how does the firm make this design choice between homogeneous and heterogeneous units – and thereby select its interaction structure? In line with the literature on the locus of decision making, I assume that a structure is chosen for the purpose of addressing a given broad challenge or goal. For example, a firm may aim to become more innovative, efficient, or customer oriented and therefore adjust its organization structure to support that strategy.

However, it is widely acknowledged that there are limits to the number of dimensions that a firm's structure can effectively emphasize (Galbraith, 2008; Lawrence & Lorsch, 1967). Adopting a new structure, or even moving in that direction, involves trade-offs among the problems that a new structure could conceivably address. In other words, using corporate structure to solve problems along one dimension comes at the expense of *not* solving problems along other dimensions. Such trade-offs can be addressed by complex matrix structures, but they are difficult to implement and maintain (Galbraith, 2008; vis & Lawrence, 1977).[4] The result of this trade-off between the benefits and limitations of homogeneous and heterogeneous units tends to be an unbalanced – but not extreme – interaction structure. At the corporate level, such design choices often yield a hybrid structure that contains some product- and market-based units in addition to some global functional units.

Reorganizations and Interaction Structure

These trade-offs between different interaction structures have implications for the dynamic context of reorganizations. It is well known that implementing a new structure takes time. During a reorganization, employees must modify their behavior to accommodate new processes, incentives, and lines of reporting (Anderson & Lewis, 2014). The result is an *adjustment lag* between the reorganization's rollout and the time when top management can finally observe some results from implementing the new structure (Lamont et al., 1994; Miller & Friesen, 1983).[5] During this initial implementation phase, the new structure's benefits increase over time. Only after employees have adjusted their behavior to the new interaction structure – and abandoned their old ways of "getting things done" – can the new structure finally exhibit its

[4] The challenges of implementing and maintaining a matrix structure reflect the demands it places on employees. Given their limited resources (e.g., time, cognitive capacity, budget) and in light of strong social factors (e.g., power, career aspirations, favors) affecting their choices, employees are more productive if they report to just one or at most two supervisors (Ford & Randolph, 1992; Joyce, 1986).

[5] A caveat to this generalization is that some cost-cutting measures (such as closing down or spinning off entire business lines) will take effect almost immediately. Although corporate-level reorganizations may include such actions, they are not limited to changes of that type.

desired effects. It is by considering this adjustment lag that my study of the interaction structure (i.e., independent of the decision-making locus) can develop novel insights.

There are, in particular, two outcomes that result from employees adjusting their behavior to the current structure: (1) the targeted challenges and goals are resolved and achieved; and (2) problems not properly addressed by the current structure are shifted into the foreground. Hence the opportunity costs of adopting this particular structure become more apparent over time. Since changing the firm's structure is both costly and disruptive (a fixed cost), it follows that firms will reorganize only after encountering a new design challenge with which the current interaction structure is incapable of dealing. Suppose, for example, that the structure in Figure 2 were adopted in order to cut costs by merging all R&D units into a single global laboratory. This change would reduce the total number of employees and facilities needed and so would lower operational overhead – benefits that can be achieved over some initial time period.

The new structure would incentivize the R&D team to develop innovations that could be applied across the firm's various product lines. Although the firm might eventually lag behind its competition in, say, cutting-edge cell-phone features (the opportunity costs of any current structure become apparent as time passes), this problem could be remedied by isolating R&D efforts in a product-based unit focused on cell phones. That solution would be adopted when the potential benefits of adopting it (minus the reorganization costs) start to outweigh the current structure's benefits. This example illustrates that the firm did not simply "get it wrong" when implementing the global R&D unit, since doing so was an effective cost-cutting solution and served the firm well for an extended period. Yet after that goal was achieved, new problems (here, a lack of cell-phone innovation) moved to the foreground. The revised structure's inability to address that development guided the choice of the *next* reorganization's interaction structure, which in this case was a shift toward units that were more heterogeneous.

More generally, we can view organization design i (OD_i) as having a benefit function that increases at first but then plateaus quickly as the opportunity costs of maintaining design i increase with time. This design's cost–benefit function is plotted in Figure 3. Suppose that the

benefits of adopting a different design j at time t_j are denoted b_j, and let $r_{i,j}$ denote the fixed cost of reorganizing from i to j. Then the next reorganization is expected to occur at time t^*, which is when the benefits of design j minus the fixed reorganization costs $r_{i,j}$ intersect the cost–benefit function of organization design i. Only if the different designs have these general properties should one expect repeated reorganizations to constitute an equilibrium.

[[INSERT **FIGURE 3** ABOUT HERE]]

Because the interaction structures of homogeneous and heterogeneous units are complementary, firms can be expected to shift their focus between more homogeneous and more heterogeneous interaction structures over time. The reason is simply that structures with a greater homogeneous focus can solve problems that a structure with a greater heterogeneous focus cannot – and vice versa. Thus my first hypotheses can be formally stated as follows.

Hypothesis 1a (H1a)**.** *A greater proportion of* homogenous *units in the firm's current structure is associated with a shift toward more* heterogeneous *units in its next reorganization.*

Hypothesis 1b (H1b)**.** *A greater proportion of* heterogeneous *units in the firm's current structure is associated with a shift toward more* homogeneous *units in its next reorganization.*

Although these reorganizations appear to shift the firm's focus back and forth between more homogeneous and more heterogeneous interaction structures, this pattern does not imply that firms fail to learn. An important implication of studying a firm's interaction structure is the ability to "unravel" the actual designs adopted. Thus we can see that firms' structures, despite tending to shift between different foci, progress over time. It is in this context where the distinction between interaction structures and locus of decision making power allows for more nuances. For example, a firm that shifts from a greater focus on heterogeneous units to adopting more homogeneous units and then to adopting more heterogeneous units in the next reorganization would likely be classified as shifting from decentralization to centralization and then back to decentralization. In contrast, studying the interaction structures presents this pattern as an indication that the firm is focusing on different challenges.

The firm's initial focus on heterogeneous units may have reflected, for instance, a perceived need for greater market responsiveness that led to creating a product unit dedicated solely to cell phones. That change might be followed by a perceived need to reduce costs and hence by the creation of a global R&D unit (i.e., shifting toward a more homogeneous focus), which could be followed in turn by the addition of a market-based unit for China – that is, to address insufficient responsiveness in tailoring products to suit that growing market (i.e., now shifting toward a more heterogeneous focus). The crucial point here is that, even though both the first and third structure involve shifts toward a more heterogeneous focus, they each change the firm's strategic focus by moving it in *different* directions. Thus a pattern of apparent reversals is more accurately viewed as indicative of the firm's active learning: exploiting the benefits and shortcomings of different interaction structures.

Implications for the Timing of Reorganizations

My focus on interaction structure and its effect on reorganizations presents the opportunity to generate additional insights. Suppose an interaction structure is truly driving the shifts between a greater focus on homogeneous and heterogeneous business units; then it should matter *who* is grouped together in the business unit. I posit that different interaction structures systematically generate adjustment lags of different lengths, a dynamic that bears implications for the next reorganization's expected timing as a function of the firm's current interaction structure.

I have mentioned that employees do not adjust their behavior immediately after a reorganization is announced (Hannan, Pólos, & Carroll, 2003; Lamont et al., 1994). In fact, such an announcement is but the first step in surmounting the challenge or achieving the goal that management seeks to address. But what, exactly, does it mean for a reorganization to be "implemented"? Apart from drawing up the new interaction structure, managing the logistics of moving employees into their new units, and revising the organization chart with all its implications (e.g., establishing new reporting and remuneration paths, disseminating information about the changes), it is the *behavior of employees* in solving their tasks – including whom they approach to collaborate with – that must reflect the changed corporate structure if the

reorganization is to have its desired effect. Employees are grouped into the same unit so as to facilitate the communication and coordination of their activities by aligning their incentives with common organizational subgoals (at the unit level) and by enabling the interactions necessary for effective collaboration. However, these outcomes will not be observed until employees have at least partially adjusted their information processing patterns to the new structure.[6]

Suppose that employees are identical – in other words, that all employees have the same background and expertise. Then the duration of their adjustment process (i.e., before a reorganization yields visible effects) should not vary with the *type* of new interaction structure implemented. This is the baseline assumption in prior work (Gulati & Puranam, 2009; Nickerson & Zenger, 2002). Recall, however, that organizational behavior scholars have described how employees dedicated to different organizational functions (e.g., scientists in an R&D unit, salespersons in a global sales office) differ in their approach to tasks and in their interpretation of the environment (Ancona & Caldwell, 1992; Cronin & Weingart, 2007; Dougherty, 1992; Joyce, 1986).

If we take as given these fundamental differences in how employees perceive problems and approach tasks, then employees in homogeneous units (grouped with others of the same functional background) can be expected to adjust their behavior more rapidly than do employees in heterogeneous units (grouped with others who have distinct functional backgrounds). When an employee is grouped with others of the same type (say, engineers), it is likely that they all share the same "thought world" (Dougherty, 1992) and hence should encounter fewer "representational gaps" (Cronin & Weingart, 2007). These claims are illustrated by the extent of overlap in the Venn diagram of Figure 2's panel (a). Yet if the same employee is grouped with employees of other types (e.g., engineers, salespersons, procurement managers), then the extent to which they all share a common knowledge base will be considerably less; see the Venn diagram in panel (b)

[6] Research has addressed the limitations of this behavioral adjustment as well as its time lag, and scholars have shown that its effects may be both beneficial or detrimental to the firm (Gulati & Puranam, 2009; Lamont et al., 1994; Miller & Friesen, 1983; Nickerson & Zenger, 2002; Soda & Zaheer, 2012).

of the figure. It follows that the types of units into which employees are grouped should strongly affect how rapidly they achieve effective collaboration.

Shifting focus now to the corporate level, and thus aggregating upward the interaction structure's effects, I have argued that two outcomes are likely once employees adjust their behavior and information processing patterns to the new structure: (1) the reorganization's purposes are achieved; and (2) new problems become more prominent that the now-current structure cannot address satisfactorily. One factor with a strong effect on these two outcomes is *how long* it takes employees to adjust their behavior and information processing patterns to the new interaction structure. If the firm's corporate structure contains many homogeneous units, then the employees in those units learn to collaborate effectively within a relatively short period of time. In that event, the firm – as compared to the case of many heterogeneous units – should not only (1) achieve its reorganization purposes relatively sooner but also (2) advance more quickly on addressing problems that the current structure is insufficient to address. These differences in the adjustment time required to achieve effective information processing and collaboration imply that heterogeneous units require *more* time to be implemented (e.g., employees must lay more groundwork before collaborating with dissimilar than with similar colleagues).[7] With regard to the costs–benefit function plotted in Figure 3, this argument translates into a function (for designs with homogeneous interaction structures) that at first rises steeply but then reaches an inflection point sooner than would a design with a heterogeneous interaction structure. Although other factors may contribute to this theorized effect, my core argument is that the firm's present interaction structure has a systematic yet asymmetric effect on the timing of the next reorganization.

Hypothesis 2a (H2a)**.** *A greater proportion of* heterogeneous *units in the firm's current structure is associated with a* longer *delay until the next reorganization occurs*.

[7] It is also possible that heterogeneous units are better (than are homogeneous units) at addressing a broader range of goals and challenges, an advantage that may contribute to the observed timing asymmetry with respect to unit type.

Hypothesis 2b (H2b)**.** *A greater proportion of* homogeneous *units in the firm's current structure is associated with a* shorter *delay until the next reorganization occurs*.

There are three benefits to developing these additional insights. First, it showcases my proposed mechanism's generative power and highlights the importance of connecting the micro and macro levels of analysis when exploring the richness of the reorganization phenomenon. Second, it enables a critical experiment for testing the posited micro mechanism against the null hypothesis that the apparent reversals are simply driven by regression to the mean. If I do find support for H2a and H2b both, then the existence of timing asymmetry would indicate that this mechanism is indeed more likely at play than is regression to the mean (since the latter does not predict asymmetric timing). Third, Hypotheses 2 lend additional backing to my claim that each reorganization signifies both progress and managerial learning. So when firms adopt a structure with a more heterogeneous focus, a consistent delay should occur only when that structure is novel to the firm; that is, there should be no delay if the *same* structure were being re-adopted.

DATA AND METHODS

Data Description

Hypotheses 1 and 2 were tested on the global cell-phone manufacturing industry. There are five reasons why this industry is especially well suited to examining my research question. First, the consumer cell-phone industry is relatively young (it has existed only since 1983) and therefore allows one to collect reorganization data from its inception. Second, since the industry comprises relatively few players, I was able to collect data on nearly the entire population of firms. Third, this industry allows for the testing of multiple reorganizations per firm over time – a vital feature because I require a setting in which the mechanism is clearly manifest. Fourth, the focal companies are all in the same industry; hence I can ensure a relatively controlled organizational environment because all firms experience the same type and timing of significant environmental events. Fifth, homogeneous units map nicely onto functional units, as do heterogeneous units

onto product and market units. So for this industry I can use functional and product/market units as proxies for homogeneous and heterogeneous interaction structures.

The study's sample consists of 1,621 firm–quarter-year observations of 34 firms over the 25-year period from 1983 through 2008, and it contains 102 corporate-level reorganizations.[8] Note that the panel is unbalanced owing to the entry and exit of firms during the period under observation. The sample selection process began with Gartner's list of firms having the highest market share in 2008 and was supplemented by searches on Hoover's, the website of GSM (a standard-setting body), and the World Wide Web to capture all major cell-phone manufacturers. In addition to tracking the 21 firms identified in 2008 back to their founding (or to their entry into the cell-phone manufacturing market), I conducted this same search for each year from 2008 to 1983. The final sample contains firms that held a combined global market share exceeding 99% in 2008 and in all previous years – a total of 34 manufacturers. The other 1% consists of firms (most of which were located in China during the study's time frame) that specialize in replicating *other* firms' phones to sell locally; my study excludes such firms because I could find no viable data for them. Hence the results reported here do not pertain to all firms in the Chinese cell-phone manufacturing segment. A single-industry setting allows me to control for changes in the external environment that similarly affect all firms in the sample; the downside of this approach is that it results in a relatively small sample size. I address that issue by using two different regression models to test each hypothesis. Although a larger number of events would naturally be preferable, I believe that the greater control allowed by this single-industry study can establish effects that could be subsequently tested in studies covering more industries.

Reorganization-level data. These data were manually collected from trade press and newspaper articles accessed via Factiva. Those data sources were supplemented by annual reports, companies' websites, press releases, and analyst reports. For each corporate-level reorganization I used these data to match its announcement date, the name and description of the

[8] Two of these firms did not report any corporate-level reorganizations during the time period and so were omitted from the fixed-effects models.

top-level business units before the reorganization, and the name and description of the new structure's units (i.e., after the reorganization). I then used those descriptions to code the old and new business units as being based on products, markets, or functions (Fligstein, 1985; Williams & Mitchell, 2004).

By collecting data on the old and new business units surrounding each reorganization announcement, I ensured data collection on all corporate-level reorganizations. For example, reports on the first reorganization by Motorola after 1983 described the different business units constituting the structure prior to the change as well as those of the newly adopted structure. Articles discussing Motorola's next reorganization again described its current structure, which allowed me to ensure that no reorganization was missed – that is, because the second reorganization's "old" structure coincided with the first reorganization's "new" structure.

For conglomerates, I collected data on the subsidiary responsible for cell-phone manufacturing activities; so in the case of Samsung Co., for instance, I collected data on the reorganizations undertaken by Samsung Electronics.[9]

I gathered 50–100 articles for each reorganization to obtain a rich description of every business unit's primary purpose. This information allowed me to "distill" each unit's interaction structure: whether it grouped employees into a homogeneous unit (such as global R&D or sales) or into a heterogeneous unit (such as cell-phones or North America).[10] Although corporate-level reorganizations might change only a few business units, the resulting structural shifts are still disruptive and strategically important. I focus on corporate-level changes to ensure that reorganizations were indeed significant for the organization as a whole. For example, a change in just one business unit at the bottom of the hierarchy will hardly be noticed by most individuals in the corporation. Yet a change in just one top-level product unit will affect the entire section of

[9] A second coder (who was blind to the study) was also tasked with the reorganization coding. For a subsample of firms, this second coder also collected relevant data to ensure that no information had been overlooked. There was no disagreement – with regard to either the collection or coding of data – as a function of coder identity, which confirms the straightforward nature of assigning business units to the categories I used.

[10] Examples of the coding procedure are given in the Online Supplementary Material.

that business – that is, at each hierarchical level below the corporate one – as well as the functional and market units to which the focal unit is interconnected through hybrid or matrix structures (see Hannan *et al.*, 2003). When Motorola merged just two business units in 2006, for instance, the reorganization "involve[d] nearly 50 percent of the company's nearly 70,000 employees."[11] So even though many reorganizations may appear to be small, they can have a substantial impact on the firm.

Firm- and industry-level data. Performance measures and numbers of employees were obtained from Compustat and Datastream and were complemented by information derived from annual reports. Those reports were also my source for information on the year of founding, year of entry into the cell-phone market, and extent of diversification of the firm (or its relevant subsidiary). Data on CEO changes were collected via Factiva using a method similar to that employed for reorganization data, and the industry's number of reorganizations was inferred from the reorganization-level data. In addition, I tracked firm entry and exit to capture the industry's number of *active* competitors.

[[INSERT **FIGURE 4** ABOUT HERE]]

Figure 4 (top panel) plots all reorganizations in this sector from the industry's inception in 1983 to the end of data collection in December 2008. This figure includes the total number of active firms – and the number of exits from the industry – for each year. Note that there are many reorganizations coinciding with the dot-com crash of 2001 and with the iPhone launch and subprime mortgage crisis in 2007; also, the number of active firms declined during the economic downturn in 2008. Hence it is clear that external events play a role in the overall pattern of reorganizations. The question that I address is whether (or not) internal factors are *also* important enough to influence these reorganization decisions, their direction, and their timing.

[11] CMP TechWeb, "Motorola Merges Two Businesses Units" (3 March 2006); for more details, see the Online Supplementary Material.

Measures

Dependent variables. I test Hypotheses 1a and 1b by way of a dichotomous measure of the probability that a reorganization ran counter to the firm's current structure. Thus, for every reorganization I code the *relative* increase and decrease in homogeneous and heterogeneous units. A reorganizing firm that increases its number of homogeneous units and/or reduces its number of heterogeneous units is coded as a shift toward greater homogeneity (H1a). Conversely, a firm that increases its number of heterogeneous units and/or reduces its number of homogeneous units is coded as a shift toward greater heterogeneity (H1b).[12] The two types of shifts for the industry are plotted by year in Figure 4 (bottom panel). I test Hypotheses 2a and 2b by using a count measure of the number of days between reorganizations.

Independent variables. The independent variable is the proportion of homogeneous (or heterogeneous) units. For every structure adopted, I code the number of homogeneous and heterogeneous units and then calculate, as just described, the proportion of the focal structure's homogeneous (or heterogeneous) units.[13]

Control variables. These variables were chosen specifically to control for reorganization triggers frequently identified in the literature. Unless stated otherwise, all control variables are lagged by one year relative to the focal reorganization. I control for *Change in CEO*, an event commonly associated with changes in strategy; this dichotomous variable captures whether (or not) a CEO change occurred during the 12 months prior to reorganization (cf. (Chandler, 1962)).[14] I also control for the firm's number of rivals in order to capture changes in the

[12] There were four reorganizations that left the structural emphasis unchanged – for example, a shift from three homogeneous and three heterogeneous units to four homogeneous and four heterogeneous units. For these cases, I inspected the raw data to discern the strategic shift that accompanied the announcement and then coded the reorganizations accordingly. I also tested for whether omitting those observations affected the results (it did not).
[13] Since each of these measures is the other's inverse, I report results only for the proportion of homogeneous units. It would be preferable to count the number of employees who are grouped into homogeneous versus heterogeneous units, but unit-level employee data were not available.
[14] Changes in the head of the *business unit* responsible for the cell-phone product line would be a more direct proxy for leadership influence. Yet because the data set was international and ranged widely in time, we were not able to obtain information related to this variable for most of the sample.

competitive environment. In addition, I control for company *Age* and *Degree of diversification* (at the time of the reorganization) because research in corporate strategy (Chandler, 1962) and life-cycle theory (Kimberly & Miles, 1980; Quinn & Cameron, 1983) suggests that larger companies are less likely to adopt a purely homogeneous structure and also that age is correlated with more complex organizational structures (e.g., divisional, multi-divisional, matrix).

To see whether companies tend to imitate the reorganization behavior of other firms in their sector (cf. (Haveman, 1993)), I control for the number of reorganizations in the cell-phone manufacturing industry by their type: the variables *Industry hom shifts* and *Industry het shifts* represent the count, in a given year, of reorganizations shifting the firm toward (respectively) a more homogeneous or heterogeneous focus (see bottom panel of Figure 4). To control for firm performance, I follow (Audia & Greve, 2006) and use *Return on assets*. Finally, I include the rationale given – in official announcements – for each reorganization in order to control for sequential attention being paid to competing goals (Cyert & March, 1963). For every reorganization, the firm releases information about its purpose (e.g., "to improve efficiency"); I coded these rationales either as "cost efficiency" or as "market responsiveness" and then set the binary indicator *Competing rationales* to 1 (resp., to 0) if the subsequent reorganization had (resp., did not have) a contrary rationale.

[[INSERT **TABLE 1** ABOUT HERE]]

Table 1 reports descriptive statistics and the piecewise correlation matrix for all variables; as expected, the coefficients are relatively high for the firm- and industry-level reorganization measures. There are missing values for two types of variables: the lagged independent variables (one observation per firm is lost because of the lag structure) and return on assets (ROA), my proxy for performance.[15] Of the sample's 102 reorganizations, 47% (resp., 53%) shifted the firm's focus toward more homogeneous (resp., more heterogeneous) units.

[15] The main models include ROA because performance plays a crucial role in reorganization decisions. Because Compustat and Datastream could provide only incomplete ROA data, I hand-collected as many missing values as possible through annual reports.

Model Specification: Type of Change

The dependent variable for testing the type of change across reorganizations is a dichotomous measure; hence I use a panel logit model with fixed effects to test Hypotheses 1a and 1b.
A fixed-effects model should help control for some alternative explanations that are difficult to assess using my data – provided that these factors do not change over time. Examples include the extent to which reorganizations are driven by politics, collaboration, or feedback (Cyert & March, 1963).

Model Specification: Timing of Change

The dependent variable that I use to test the timing effect on reorganizations is a count measure; therefore, Hypotheses 2a and 2b are tested via a panel Poisson model with fixed effects and robust standard errors (SEs).[16] The data's structure precluded running a standard Hausman test to confirm that using fixed effects was appropriate. However, running Stata's *xtoverid* command yields support for the fixed-effects model in that the random-effects coefficients are equivalent to those derived from a pooled ordinary least-squares (OLS) regression; note also that fixed-effects models limit the bias due to omitted variables. All analyses were run in Stata (version 15.1).

RESULTS

Type of Reorganizations

Table 2 presents results of the fixed-effects logit regressions used to test for whether a firm's current structure affects the type of structure chosen in its next reorganization. I find that a greater proportion of *homogeneous* units in the current structure increases the probability of a countering reorganization – that is, one toward more heterogeneous units ($\beta = 3.899,\ p < 0.01$, Model 6); a greater proportion of *heterogeneous* units in the current structure likewise increases

[16] Notwithstanding the data's overdisperson, I follow the literature in disregarding the negative binomial model because estimating it is not a true fixed-effects procedure in Stata. In fact, there is widespread support for using panel Poisson models in such cases (see (Wooldridge, 1999).

the probability of a countering reorganization toward more homogeneous units ($\beta = 5.23,\ p < 0.01$, Model 4, [(-1)*β]). These results support Hypotheses 1a and 1b.

[[INSERT **TABLE 2** ABOUT HERE]]

The impact of these relationships is considerable: an increase of one homogeneous unit in the old structure increases the likelihood of a countering reorganization by a factor of 3.9 while reducing the likelihood of a shift in the same direction (toward a more homogeneous structure) by a factor of 5.2. My study's independent variable is constructed such that the converse relationship holds: an increase of one heterogeneous unit increases the likelihood of a countering reorganization by a factor of 5.2 while reducing the likelihood of a shift in the same direction (here, toward a more heterogenous structure) by a factor of 3.9. These findings are robust to using a panel OLS regression with either random or fixed effects; results for the latter are reported in Models 7 and 8 of Table 2 (all OLS models are available in Table 2A in the Online Supplementary Material).

Timing of Reorganizations

In Table 3, Models 1 and 2 present results of the fixed-effects Poisson regressions used to test for whether the firm's current structure affects the timing of subsequent reorganizations. I find that the greater the proportion of homogeneous units in the firm's current structure, the sooner (i.e., fewer days until) the next reorganization occurs ($\beta = -1.711,\ p = 0.027$); conversely, the greater the proportion of heterogeneous units in the firm's current structure, the longer (i.e., more days) until the next reorganization ($\beta = 1.711,\ p = 0.027$). These results, too, are robust to using a panel OLS regression with random or fixed effects; the fixed-effects model's results are reported in Models 3 and 4 of Table 3.

[[INSERT **TABLE 3** ABOUT HERE]]

Robustness Checks

My findings are robust to a variety of models and specifications. I conducted event history analyses using both parametric and nonparametric hazard models (while using time interactions

for H2). Across those alternative specifications, both the direction and significance of the hypothesized predictors are consistent with the findings already reported. These results hold also when I use a different coding approach – the total *count* of units of different types – for the independent variables. I also tested for timing asymmetry (H2) while using *relative shift toward homogeneous (heterogeneous)* as the dependent variables, thereby accounting for the oscillation described in the extant literature; my results continue to hold.

In addition, I ran these and the previously described models with the following additional control variables.[17] (1) Mergers between cell-phone manufacturers arguably change the competitive landscape, which may induce reorganizations by affected (and other) players; however, controlling for mergers (for the firm that merged and also for the industry's number of mergers) has no significant effect on other variables or on the results. (2) Controlling for two "game-changing" events – the 2001 dot-com crash and 2007 subprime mortgage crisis/ Apple's iPhone announcement – does not affect the observed direction or rate of change. (3) Controlling for whether a firm's current structure was a matrix organization has no appreciable effect on the direction or rate of change. (4) Finally, I established that different types of conglomerates (*chaebols*, *keiretsu*, and Western style) were structured in much the same way. This result was derived by running regressions that excluded each type (separately and jointly) and then confirming that the results were unchanged and remained significant.

Alternative Explanations

Is the reversal in reorganization types driven by regression to the mean? Regression to the mean is an alternative explanation for the tendency of subsequent reorganizations to shift the firm away from, rather than to deepen, its current focus. In particular, if one assumes that the choice of new structure is independent of the firm's current structure, then successive reorganizations can be viewed as independent draws of new structures from a given distribution whose mean is unknown and may change over time. So if the choice of structure in

[17] These regression results are available from the author upon request.

reorganization r_t is far to the right of the true mean of structures (i.e., in a graph of the distribution) then the next structure chosen, r_{t+1}, will likely be closer to the mean – that is, to the left of r_t. A shift away from the current focus will occur if the subsequent choice of new structure, r_{t+2}, lies between the first two choices. In organization theory, regression to the mean can often explain phenomena that exhibit reversal tendencies (Greve, 1999). The essential difference with respect to my theory-driven account of successive reorganizations is that I have no reason to believe that the pattern of regressing to the mean will continue indefinitely or even beyond a single instance; yet under regression to the mean, the choice of structure approaches the true mean as time *t* approaches infinity. The number of reorganizations per firm in my sample, while sizeable, is too small to reject the Null Hypothesis that regression to the mean could reasonably account for the patterns described in Hypotheses 1; however, it cannot explain the heterogeneous–homogeneous asymmetry implied by the evidence for H2a and H2b because regression to the mean would predict *no* relationship between the timing of reorganizations and the firm's current structure. Hence I conclude that the theory-driven explanation is more likely (i.e., than is regression to the mean) behind the pattern of reorganizations observed in these data.

Is the asymmetry in the timing of reorganizations driven by more rapid (or instantaneous) goal achievement in organizations with a homogeneous interaction structure? Suppose, for example, that a CEO moves away from a homogeneous interaction structure more quickly because her aim in adopting the former in the first place was to cut costs, which can be achieved instantaneously by laying off part of the workforce. To test the validity of this explanation, I control for layoffs that are associated with the reorganization (see Online Supplementary Material, Table 4, Model 1). For this purpose I use a dichotomous variable capturing whether layoffs were announced in the three (six) months before and after a reorganization's announcement and/or implementation; this variable indicates whether (or not) the focal reorganization was accompanied by layoffs. I find that controlling for layoffs changes neither the coefficients nor the significance of results reported previously. Cost-cutting attempts

are also captured by coding the official reasons given for reorganization, which often include cost cutting and other forms of "rationalization"; the results from these regressions are presented in Model 2 of Table 4 (Online Supplementary Material). Once again, my findings continue to hold. Hence this alternative explanation seems unable to account for the asymmetry result.

Is the asymmetry in the rate of change an artefact of the coding method? It is worth noting that there are more categories of heterogeneous units (i.e., product and market) than of homogeneous units (i.e., function), which means that firms may have fewer options when looking to emphasize a homogeneous focus. If one views the choice of structure as a random walk on a landscape whose peaks represent structures with a predominantly homogeneous or predominantly heterogeneous focus, then the concern articulated here would translate into a greater number of heterogeneous peaks. So suppose that reorganizations occur at a constant rate and that, for every reorganization, a new peak is chosen at random. In this scenario, there will necessarily be more switches away from heterogeneous structures than from homogeneous ones. Hence my finding of asymmetry might be more reflective of structural availability than of asymmetry in the respective adjustment lags.

One way to address this issue is to limit the structural choices to just two categories; in that case, the structural availability argument should predict that the time elapsed to the next reorganization will *not* vary as a function of the old structure's type. In contrast, my theory predicts that the time spent in a predominantly functional structure (before it switches to a predominantly product-based one) is much shorter than the time spent in a predominantly product-based structure (before it switches to a predominantly functional one). I test this prediction by calculating the ratio of product-based units to all units; the results confirm H2a ($\beta = 1.594$, SE = 0.802, $p = 0.047$).[18]

[18] As a further test of this alternative explanation, I split the heterogeneous units into their product and market components and then run the Poisson regressions using three independent variables. I find that neither the market–product comparisons nor the market–function comparisons are significant, which is not surprising when one considers the limited number of shifts that involve market units. And despite the firm's high number of product units, there are not many within-firm differences from one reorganization to the next; hence it seems there is not enough variation for these effects to show up in a fixed-effects model. However, shifts from product to function do

Is the asymmetry driven by differences in the logistical difficulty of creating a new homogeneous unit versus a new heterogeneous one? For example, adding a new market unit (heterogeneous unit) entails a substantial investment whereas adding a new global R&D unit (homogeneous unit) may be easier for the organization. This alternative explanation could drive the asymmetry result if (a) many of the reorganizations that shift a firm toward more heterogeneous units were the result of newly created markets or products while (b) the reorganizations that shift a firm toward more homogeneous units were simply recombinations of existing units. In order to test this hypothesis, I coded the origin of each new unit that was involved in each reorganization. It turns out that the reorganizations observed in this sample are exclusively recombinations; upon reflection, this should not be surprising because I focus on top-level units. That is, a new product line or market is likely to be first developed at a lower level of the hierarchy before being "promoted" to a position near the top of that hierarchy. The results for this sample of firms are therefore *not* driven by the relative difficulty of creating homogeneous versus heterogeneous units.

DISCUSSION AND CONCLUSION

The aim of this research is to examine the effect of a firm's current structure on the type and timing of its reorganizations. In particular, I explore whether there are systematic patterns whereby certain types of structure are followed by others and then examine how structure type affects the timing of a subsequent reorganization. I find that (1) successive reorganizations tend to shift away from the current interaction structure and (2) that the current type of interaction structure affects the timing of the next reorganization. These results underscore the significant influence of internal structure on the direction and timing of a firm's reorganization.

This paper deepens our theoretical understanding of organization design – more specifically, the mechanism by which a firm's current structure influences reorganization. Since

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have the anticipated positive effect: firms take longer to the next shift towards functional units if their current structure is product-based.

employees are presumed to approach challenges and tasks from their individual perspectives, which are strongly affected by their specialization and socialization vis-à-vis a particular firm function (Dougherty, 1992), it follows that interesting comparative predictions can be derived about the timing of different types of reorganizations. I propose that the way employees are grouped into different kinds of units may have implications for efficiency in that certain groupings accelerate collaboration among employees, resulting in their more rapid behavioral adjustment to the new structure. Hence grouping employees into homogeneous units based on shared activities and similar backgrounds should facilitate collaboration whereas grouping employees into heterogeneous units comprising individuals of different backgrounds and specializations can be expected to delay effective collaboration. I test these theoretical arguments empirically and find directional support for the macro-level effects anticipated if this micro mechanism does indeed influence the adjustment process between reorganizations. I find that firms shift away significantly more quickly from a homogeneous focus than from a heterogeneous one.

My second contribution to the reorganization literature is the emphasis on managerial learning in this pattern of reorganizations. By adopting a multi-dimensional concept of organization design and by focusing not on a firm's locus of decision making but rather on the interaction structure of its business units, I highlight how each is, in effect, a step toward a new design.

The confirmed systematic and ongoing shift away from a firm's current interaction structure – and the role that different types of structure play in such shifts – bear important implications for empirical studies of reorganization and for the development of pertinent theory. The empirical results reported here identify a source of variation that could explain the difficulty encountered, in the extant literature based on cross-sectional data, when attempting to document the effects of certain relevant contingency factors (see e.g. (Capon, Farley, & Hoenig, 1990). In terms of a theoretical understanding of reorganizations, my study supports the viability of (Siggelkow & Levinthal, 2005) suggestion that scholars investigate the organization's past if

they seek a true understanding of the full range of factors that affect the outcome of any given reorganization. By establishing that different types of reorganizations can be usefully distinguished by their interaction structures and by generating testable predictions that concern the rate of reorganizations, this paper promotes a closer examination of the reorganization process per se and also answers (Siggelkow & Levinthal, 2005)'s call to explore how reorganization is influenced by the *type* of structure a firm is changing from and moving toward.

More broadly, the findings reported here have noteworthy theoretical implications also for the organization design literature. When one observes misalignment between a firm's structure and its environment, the standard approach is to determine which new design would best suit the new set of "contingencies" (Donaldson, 2001). Here I revisit the importance of viewing each design problem as a *re*-design problem. At a superficial level, the implication is that this design issue is strongly affected by the firm's current structure. At a more fundamental level, this view implies that two firms facing the same exogenous shift in the environment may adopt different but equally effective new designs. Such "equifinality" – rather than merely marking the efficiency frontier of different structural options available to address any given environmental condition (Gresov & Drazin, 1997) – may also reflect the respective firms' different structural starting points and thereby indicate the new structures needed to address a changed environment. In other words, the internal structure itself helps determine which new structure is the best response to a new environmental contingency.

One limitation of this paper is that the data do not allow for a *direct* test of the mechanism I propose as underlying the rate of reorganizations. Although several alternative explanations can be rejected after testing with the available data, additional research is needed to explore the micro level of this mechanism and to verify its operation. At the very least, my finding of asymmetry in the timing of reorganizations – that is, their dependence on the interaction structure of a firm's current structure – reveals that distinguishing between different types of (current and subsequent) structures is more than a mere footnote to established interpretations of this phenomenon. Rather, such distinctions should alter the way these strategic

decisions are studied in light of my demonstration that they figure prominently as drivers of reorganization and as a means to affect both the direction and timing of such change.

Another limitation is that, although I control for performance, I do not thoroughly investigate the performance implications (or strategic drivers) of the different types of change. Such investigation was beyond the scope of this research; in any case, pursuing that line of inquiry would be a challenge given the likely correlation between (a) change types' differences in focus and (b) strategic choices related to cost-cutting versus revenue growth. A third limitation of the study is its focus on a single industry, which reduces the generalizability of my findings. Yet given the anecdotal evidence for oscillation in reorganizations in diverse other industries, this study's empirical support for such a pattern is a good foundation for related investigations of those other industries. Finally, knowledge-intensive (service) firms may well have relatively more homogeneous workforces than do manufacturing firms. Future research could profitably assess the extent to which the principles developed here apply in knowledge-based sectors. Given the extensive published results on the external triggers of reorganization, it is high time for scholars to focus on the micro-level mechanisms of this process and to see whether these findings can be replicated in sectors that are less turbulent and/or more knowledge intensive.

A practical implication of my results is that inter-unit linking mechanisms, such as cross-functional teams and information technologies that promote communication across unit boundaries, are likely to be embraced more enthusiastically if the current structure is extremely heterogeneous. These work practices aim to enhance collaboration across units, and I theorize that such practices should *reduce* the correlation between the speed of achieving collaboration and the need for structural change. With the aid of such boundary-spanning technologies, a reorganization could serve to encourage new links between employees without necessarily weakening the links that already exist. When a reorganization is initiated under these circumstances, employees are likely to have a comparatively larger set of pre-existing links to colleagues in their new unit – links that should accelerate the process of adjustment.

In addition, my findings have practical implications for the organization design literature. Those who are tasked with managing a reorganization must attend to the interaction structure not only of the new design but also of the current one; if either of these aspects is ignored, then unexpected (and probably undesired) consequences could arise upon implementation. Awareness of the *interactions* between the old and new types of structure is indispensable if the goal is to ensure a successful reorganization.

I have established empirically that the firm's current structure is itself a key determinant of reorganizations (i.e., beyond the external factors already known to affect such decisions). The finding that the current interaction structure influences the type of structure subsequently adopted accords with the extant literature on centralization and decentralization; however, it is by showing how these factors affect the *timing* of the next reorganization that I (a) contribute novel theoretical insights to the literatures on reorganization and organization design and (b) emphasize the need to study interaction structures. I argue that the grouping of employees into units with different interaction structures has far-reaching implications for efficiency. I also posit that certain groupings accelerate collaboration among affected employees and so result in a more rapid adjustment of their behavior to the new structure. In this way, the research reported here extends our understanding of organization design by showing how a firm's current structure influences employees' interaction structure and, as a result, both the type and timing of the firm's next reorganization.

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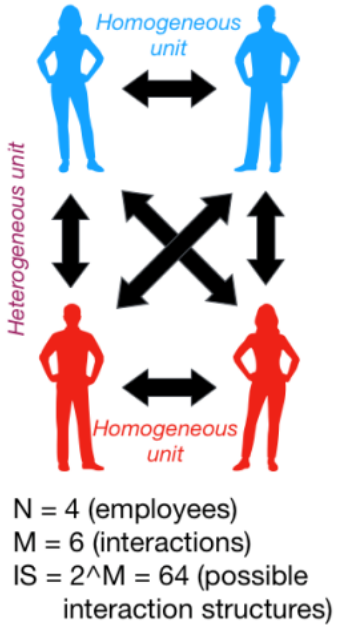
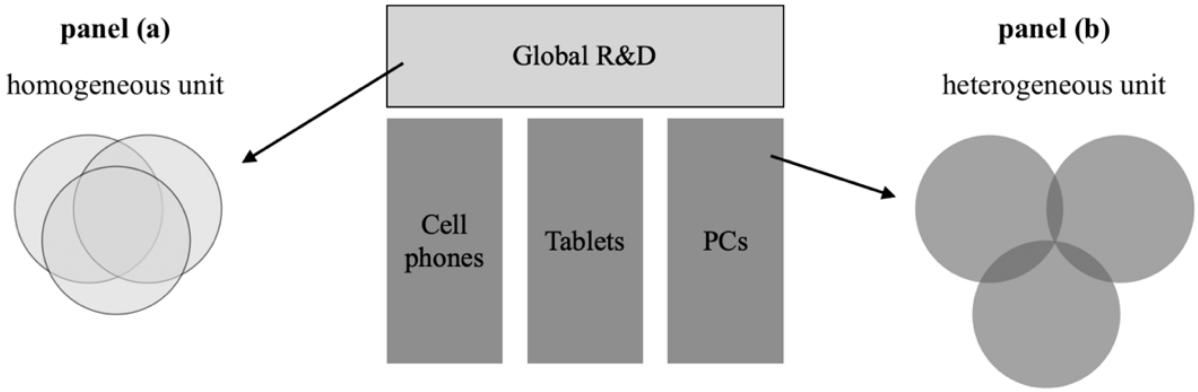
Figure 1: Interactions, interaction structures, and organization design



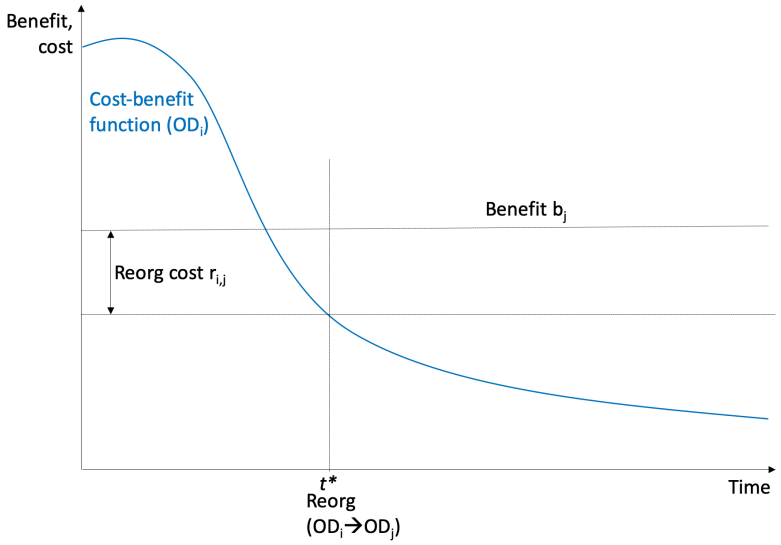
This figure illustrates the six possible two-way interactions among four employees within an organization. There are far more possible interaction structures (64) than the three usually considered in the field of organization design: functional or divisional form, or their interaction in a matrix structure.

Figure 2: Hybrid structure and employees' knowledge overlap by type of unit



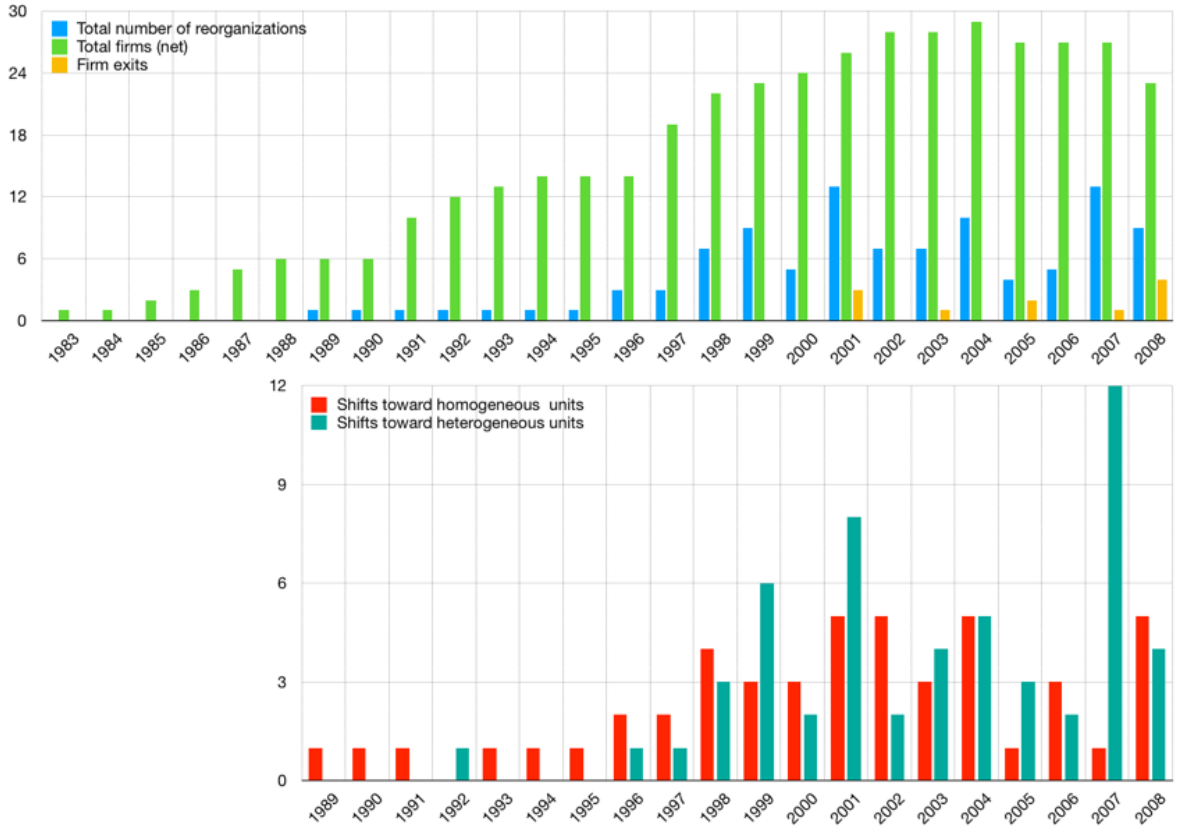
This figure depicts a typical hybrid structure and the interaction structures for different types of units. The expertise overlap among employees within a business unit is illustrated in panel (a) for a group of three strongly similar employees and in panel (b) for a group of three highly dissimilar employees.

Figure 3: Cost–benefit function of organization design and reorganizations



The blue line plots the combined cost–benefit function of the firm's current organization design (OD_1), which increases initially and starts to decrease once the opportunity costs of *not* adopting OD_2 outweigh the benefits from retaining OD_1. The reorganization occurs once the benefits of adopting OD_2 plus the fixed reorganization costs equal OD_1.

Figure 4: Cell-phone manufacturing firms and their reorganizations



The upper panel shows the active number of cell-phone manufacturing firms, industry exits, and reorganizations from the inception of the industry in 1983 until December 2008. The lower panel plots the reorganizations by type as well as the number of reorganizations that shift the interaction structure toward more homogeneous or more heterogeneous units.

Table 1: Descriptive statistics

	Variable	Obs	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Reorganization	1,621	0.06	0.244	0	1	1													
2	Shift towards hom focus	1,621	0.03	0.170	0	1	0.67	1												
3	Shift towards het focus	1,621	0.03	0.180	0	1	0.71	-0.03	1											
4	Days until next reorg	1,621	94.05	483.030	0	6574	0.51	0.41	0.29	1										
5	Hom/total (1 year lag)	1,568	0.23	0.256	0	1	0.02	-0.05	0.08	-0.02	1									
6	Het/total (1 year lag)	1,568	0.77	0.256	0	1	-0.02	0.05	-0.08	0.02	-1.00	1								
7	ROA (1 year lag)	996	0.02	0.105	-0.443	1.688	-0.01	0.04	-0.04	0.15	-0.11	0.11	1							
8	Competing rationales	1,621	0.02	0.128	0	1	0.50	0.26	0.43	0.24	0.02	-0.02	-0.02	1						
9	CEO change within 1 year	1,621	0.01	0.093	0	1	0.33	0.18	0.28	0.15	0.01	-0.01	0.06	0.09	1					
10	Age (ln)	1,621	3.53	1.114	0	5.063	0.03	0.03	0.01	0.02	-0.17	0.17	0.08	0.04	-0.02	1				
11	Degree of diversification	1,621	1.96	0.832	1	3	0.00	-0.03	0.04	0.00	0.13	-0.13	0.05	-0.02	-0.01	0.16	1			
12	# competitors (1 year lag)	1,621	21.78	7.525	0	28	0.09	0.03	0.09	0.07	0.22	-0.22	-0.21	0.04	0.03	-0.36	-0.12	1		
13	# industry hom shifts (within 1 year)	1,621	0.21	0.820	0	5	0.85	0.51	0.65	0.49	0.05	-0.05	-0.02	0.42	0.33	-0.01	0.01	0.14	1	
14	# industry het shifts (within 1 year)	1,621	0.42	1.920	0	12	0.40	0.29	0.26	0.54	0.04	-0.04	-0.01	0.16	0.15	-0.03	-0.02	0.12	0.48	1

Table 2: Fixed-effects logit and OLS regressions by type of reorganization

	LOGIT						OLS	
	(1) any reorg	(2) any reorg	(3) hom shift	(4) hom shift	(5) het shift	(6) het shift	(7) hom shift	(8) het shift
Hom/total (1 year lag)		-1.042		-5.230		3.899	-0.164	0.158
		(1.541)		(1.599)		(1.496)	(0.040)	(0.051)
		0.499		0.001		0.009	0.000	0.004
Het/total (1 year lag)	*omitted, results for het/total = (-1)*(hom/total), control variables identical*							
ROA (1 year lag)	3.068	2.425	0.991	0.011	-1.024	-0.136	0.104	-0.088
	(10.746)	(10.134)	(1.190)	(1.870)	(1.295)	(1.356)	(0.115)	(0.084)
	0.775	0.811	0.405	0.995	0.429	0.920	0.370	0.303
Competing rationales	22.857	23.868	0.583	0.744	1.584	1.453	0.058	0.244
	(1,665)	(2,415)	(0.592)	(0.650)	(0.583)	(0.611)	(0.110)	(0.154)
	0.989	0.992	0.324	0.252	0.007	0.018	0.599	0.123
CEO change within 1 year	0.710	0.306	-0.667	-0.190	1.106	1.498	-0.074	0.204
	(1.359)	(1.533)	(0.898)	(1.052)	(0.807)	(0.892)	(0.139)	(0.135)
	0.601	0.842	0.458	0.856	0.171	0.093	0.598	0.142
Age (ln)	24.176	24.636	0.117	1.380	4.624	3.490	-0.021	0.074
	(9.601)	(9.696)	(1.915)	(2.123)	(1.995)	(2.205)	(0.061)	(0.056)
	0.012	0.011	0.951	0.516	0.020	0.113	0.728	0.191
Degree of diversification	2.153	2.283	0.948	0.876	-0.559	-0.650	0.050	-0.031
	(1.054)	(1.044)	(0.488)	(0.520)	(0.976)	(0.987)	(0.008)	(0.011)
	0.041	0.029	0.052	0.092	0.567	0.510	0.000	0.007
# competitors (1 year lag)	-0.288	-0.277	-0.133	-0.115	-0.135	-0.131	-0.000	-0.003
	(0.169)	(0.170)	(0.055)	(0.061)	(0.068)	(0.073)	(0.001)	(0.001)
	0.087	0.104	0.016	0.060	0.047	0.072	0.908	0.018
# industry hom shifts (within 1 year)	6.392	6.463	1.070	1.131	1.246	1.247	0.100	0.128
	(1.765)	(1.804)	(0.160)	(0.178)	(0.174)	(0.174)	(0.015)	(0.017)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
# industry het shifts (within 1 year)	-0.304	-0.302	0.188	0.230	0.020	0.012	0.006	-0.005
	(0.170)	(0.171)	(0.061)	(0.069)	(0.065)	(0.066)	(0.005)	(0.006)
	0.073	0.077	0.002	0.001	0.757	0.854	0.279	0.347
Constant							0.031	-0.167
							(0.204)	(0.191)
							0.879	0.390
Observations	857	856	840	839	836	815	994	994
Number of firms	25	25	23	23	23	23	32	32
Log-Likelihood	-18.69	-18.47	-67.72	-58.89	-59.64	-54.90		
R-square							0.296	0.454

standard errors in parentheses,
p-values underneath

Table 3: Fixed-effects Poisson and OLS regressions by timing of reorganization

	Poisson regressions		OLS regressions	
	(1)	(2)	(3)	(4)
	days until the next reorganization			
Hom/total (1 year lag)		-1.711		-383.664
		(0.775)		(141.952)
		0.027		0.011
Het/total (1 year lag)	*omitted, results for het/total = (-1)*(hom/total), control variables identical*			
ROA (1 year lag)	1.429	1.056	1,041.040	1,029.117
	(0.356)	(0.422)	(838.818)	(810.576)
	0.000	0.012	0.224	0.214
Competing rationales	0.984	0.923	301.010	280.385
	(0.527)	(0.573)	(256.257)	(265.378)
	0.062	0.107	0.249	0.299
CEO change within 1 year	-0.039	0.036	-142.775	-159.032
	(0.613)	(0.620)	(308.977)	(299.479)
	0.950	0.954	0.647	0.599
Age (ln)	2.353	3.191	-42.483	53.271
	(1.198)	(1.235)	(90.879)	(76.834)
	0.050	0.010	0.643	0.493
Degree of diversification	0.101	0.052	35.931	54.769
	(0.210)	(0.214)	(38.703)	(37.779)
	0.630	0.809	0.360	0.157
# competitors (1 year lag)	-0.182	-0.171	-3.878	-1.411
	(0.032)	(0.034)	(4.356)	(5.063)
	0.000	0.000	0.380	0.782
# industry hom shifts (within 1 year)	0.826	0.819	176.156	170.043
	(0.072)	(0.079)	(37.444)	(37.513)
	0.000	0.000	0.000	0.000
# industry het shifts (within 1 year)	0.254	0.252	99.875	100.994
	(0.037)	(0.037)	(26.260)	(26.051)
	0.000	0.000	0.001	0.001
Constant			182.087	-181.022
			(305.087)	(285.017)
			0.555	0.530
Observations	996	995	995	994
Number of firms	32	32	32	32
Log-Likelihood	-115028	-110967		
R-squared			0.401	0.407

standard errors in parentheses, p-values below

SUPPLEMENTARY MATERIAL

Coding Example

For each firm, we started by establishing the current (2008) structure as described on the company's website or latest annual statement. We then searched – over five-year intervals – for the company's name in combination with each of the search terms "reorgani*", "restruc*", and "change" before browsing through the results (several thousand articles). When this procedure yielded a reorganization announcement, we focused on a ±6-month time window around the announcement date while selecting articles that provided such details as the rationale for reorganizing and descriptions of the old and new structures. For each reorganization we read some 50–100 articles, of which we selected for coding roughly 20 that together yielded enough information about: (1) the old and new business units and the firm's overall structure; (2) whether or not the CEO changed within the preceding 12 months; (3) the CEO's statement about the reorganization; and (4) whether or not it was accompanied by layoffs.

In what follows we provide excerpts from various articles on the 2006 reorganization of Motorola Inc. Comments within brackets describe particulars concerning how the data were coded.

"Motorola, Inc today announced a reorganization of its Networks and Government & Enterprise Mobility Solutions businesses into one organization, to be called the Networks & Enterprise business. [These unit names are clearly the three "official" labels; we therefore cross-referenced the first two names mentioned with the structure that we believed Motorola held before it initiated this particular reorganization.] 'This reorganization will allow us to strengthen our position in providing end-to-end network infrastructure solutions to private, public and enterprise customers

worldwide,' said Ed Zander, Chairman and CEO. 'The new business also will leverage key current and next-generation technologies across those various market segments. With a more streamlined structure, Motorola will move faster, improve the cost structure of the company, including general and administrative activities, and be more effective in meeting customer needs going forward.' [This quote provided us with a first idea of the reorganization's rationale.]"
In PR Newswire (U.S.), "Motorola Combines Networks and Government & Enterprise Mobility Solutions Businesses; New Organization Will Further Advance Seamless Mobility Strategy, Improve Operational Efficiency and Cost Structure" (3 March 2006).

"Motorola Inc. , the world's No. 2 cell-phone maker, said on Friday it is combining its network equipment and government and corporate units in a bid to cut costs and win new business. The network unit sells equipment that runs cell-phone networks, [This statement gave us a strong indication that the focal unit is both product- and market-based and thus heterogeneous.] a segment that analysts say has become cutthroat because of too many suppliers. The other business sells wireless gear to government and large business clients. [This is likely a market-based unit that focuses on government and large business clients.] … 'I believe it makes sense because it eliminates the duplicative research and development between the two divisions,' [Oppenheimer analyst Lawrence] Harris said."
In Reuters News, "UPDATE 1—Motorola combining networks, government units" (3 March 2006).

" 'I believe it makes sense because it eliminates the duplicative research and development between the two divisions,' said Oppenheimer analyst Lawrence Harris. 'The technologies and

the pursuits of the two divisions have been coming closer together because the government unit [An analyst calls this the "government unit", which further supports our initial suspicion that it is market based.] has been pursuing bids to sell network equipment to public safety agencies and state governments,' he said, noting that they previously focused more on selling walkie-talkie radios."

In CNET News.com, "Motorola combining networks, government units; Company hasn't yet said how move will help cut costs, but analyst says it will eliminate redundant R&D" (3 March 2006).

"The realignment stands to involve nearly 50 percent of the company's nearly 70,000 employees."

In CMP TechWeb, "Motorola Merges Two Businesses Units" (3 March 2006).

"John Slack, an analyst with Morningstar Inc. in Chicago, said: 'It's somewhat of a surprise to see them moving to combine these businesses just after reorganizing them a year ago. I think what we're seeing are the lines blur between a lot of Motorola's business lines.' Jane Zweig, president of Shosteck Associates, wireless industry analysts in Wheaton, Md., said the consolidation makes sense. 'Both groups deal with networks,' she said. 'These products work for cellular carriers as well as public safety agencies so the combined group has synergies and makes sense strategically. Networks will be able to integrate products for several markets and make more use out of Motorola's R&D.' [Another indication that our coding of these units as heterogeneous was correct.]"

In Howard Wolinsky, "Motorola merges divisions; no word on layoffs" (Chicago Sun-Times, 4 March 2006).

Because all these articles assumed that readers knew what the two old units did, we returned to the previous reorganization announcement in which those units were described in detail.

"Motorola will focus the company on the following areas: …

Networks. Motorola will consolidate its network businesses into a single seamless organization to leverage talent, R&D and operating efficiency. The new Networks business will focus on existing cellular radio access networks, core IP networks including next generation IMS/softswitch technologies, iDEN infrastructure, telco wireline access, embedded communications and computer platforms, a new 802.XX mobile broadband group and a services and an applications management services business. Adrian Nemcek, president, will lead the new Networks business. [This confirms our coding scheme, which labeled the unit as product based.]

Government and Enterprise. Building on the success of the company's mission-critical voice and data delivery to traditional and emerging customers, Motorola will consolidate its market- and solutions-oriented businesses into a new organization that will bring our most advanced seamless mobility applications to Fortune 500 class enterprises, governments and automobile manufacturers worldwide. Greg Brown, president, will lead the new Government and Enterprise business. [This unit is clearly focused on the markets of government and large enterprises.]"

In PR Newswire (U.S.), "Motorola Realigns Businesses to Drive Seamless Mobility Strategy" (13 December 2004).

Table 2A: Fixed-effects OLS regressions by type of reorganization

	(1) any reorg	(2) any reorg	(3) hom shift	(4) hom shift	(5) het shift	(6) het shift
hom/total (1 year lag)		-0.008		-0.164		0.158
		(0.057)		(0.040)		(0.051)
		0.892		0.000		0.004
het/total (1 year lag)	*omitted, results for het/total = (-1)*(hom/total), control variables identical*					
ROA (1 year lag)	0.017	0.017	0.108	0.104	-0.091	-0.088
	(0.045)	(0.045)	(0.125)	(0.115)	(0.097)	(0.084)
	0.710	0.715	0.397	0.370	0.357	0.303
competing rationales	0.277	0.277	0.034	0.058	0.267	0.244
	(0.092)	(0.095)	(0.110)	(0.110)	(0.150)	(0.154)
	0.005	0.006	0.758	0.599	0.084	0.123
ceo change within 1 year	0.110	0.109	-0.061	-0.074	0.190	0.204
	(0.125)	(0.125)	(0.133)	(0.139)	(0.134)	(0.135)
	0.389	0.388	0.650	0.598	0.164	0.142
age (ln)	0.053	0.055	-0.048	-0.021	0.100	0.074
	(0.023)	(0.032)	(0.064)	(0.061)	(0.059)	(0.056)
	0.024	0.092	0.456	0.728	0.100	0.191
degree of diversification	0.020	0.021	0.041	0.050	-0.022	-0.031
	(0.009)	(0.008)	(0.011)	(0.008)	(0.007)	(0.011)
	0.035	0.013	0.001	0.000	0.004	0.007
# competitors (1 year lag)	-0.003	-0.003	-0.001	-0.000	-0.002	-0.003
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
	0.004	0.001	0.377	0.908	0.068	0.018
# industry hom shifts (within 1 year)	0.236	0.236	0.102	0.100	0.126	0.128
	(0.011)	(0.011)	(0.015)	(0.015)	(0.018)	(0.017)
	0.000	0.000	0.000	0.000	0.000	0.000
# industry het shifts (within 1 year)	-0.000	-0.000	0.006	0.006	-0.005	-0.005
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
	0.952	0.954	0.290	0.279	0.358	0.347
Constant	-0.145	-0.151	0.141	0.031	-0.271	-0.167
	(0.078)	(0.106)	(0.213)	(0.204)	(0.201)	(0.191)
	0.074	0.164	0.514	0.879	0.186	0.390
Observations	995	994	995	994	995	994
R-squared	0.756	0.753	0.278	0.296	0.450	0.454
Number of firms	32	32	32	32	32	32

standard errors in parentheses, p-values below

Table 4: Robustness check – Fixed-effects Poisson regressions with layoffs (Model 1) and cost-cutting rationale (Model 2)

	(1)	(2)
	days until the next reorganization	
hom/total (1 year lag)	-1.704	-1.776
	(0.753)	(0.714)
	0.024	0.013
het/total (1 year lag)	omitted, results for het/total = (-1)*(hom/total), control variables identical	
layoffs	-0.000	
	(0.000)	
	0.877	
cost-cutting rationale		-0.157
		(0.724)
		0.828
ROA (1 year lag)	1.058	1.118
	(0.423)	(0.575)
	0.012	0.052
competing rationales	0.914	0.915
	(0.599)	(0.568)
	0.127	0.107
ceo change within 1 year	0.028	0.028
	(0.638)	(0.627)
	0.965	0.964
age (ln)	3.202	3.258
	(1.236)	(1.251)
	0.010	0.009
degree of diversification	0.055	0.055
	(0.216)	(0.218)
	0.798	0.801
# competitors (1 year lag)	-0.171	-0.171
	(0.034)	(0.034)
	0.000	0.000
# industry hom shifts (within 1 year)	0.824	0.826
	(0.095)	(0.072)
	0.000	0.000
# industry het shifts (within 1 year)	0.252	0.253
	(0.037)	(0.036)
	0.000	0.000
Observations	995	995
Number of firms	32	32
Log-Likelihood	-110951	-110881

standard errors in parentheses, p-values below